# Product Datasheet

# EpoPro 212A resin with various Hardeners

**Unfilled, Low Viscosity Epoxy Adhesive, Encapsulating and Impregnating Systems**

**(Formerly Epocast 212A)**

*Typical Properties* (Not for specification purposes. All tests run at 25°C unless otherwise noted)

**Resin / A-side Properties:**

| | | |
|---|---|---|
| Appearance | Visual | Clear amber liquid |
| Specific Gravity | ASTM-D-1475 | 1.15 g/cc |
| Viscosity | ASTM-D-2393 | 600 cP |
| Flash Point, closed cup | ASTM D-92 | 78°C |

**Hardener 951 Properties:**

| | | |
|---|---|---|
| Appearance | Visual | Light yellow liquid |
| Specific Gravity | ASTM-D-1475 | 0.97 g/cc |
| Viscosity | ASTM D-2393 | 50 cP |
| Flash Point, closed cup | ASTM D-92 | 148°C |

**Hardener 9615 Properties**

| | | |
|---|---|---|
| Appearance | Visual | Liquid |
| Specific Gravity | ASTM-D-1475 | 0.95 g/cc |
| Viscosity | ASTM D-2393 | 4,000 cP |
| Flash Point, closed cup | ASTM D-92 | >98°C |

**Hardener 9816 Properties**

| | | |
|---|---|---|
| Appearance | Visual | Liquid |
| Specific Gravity | ASTM-D-1475 | 0.95 g/cc |
| Viscosity | ASTM D-2393 | 4,000 cP |
| Flash Point, closed cup | ASTM D-92 | >98°C |

**Mix Ratio:**

Parts by weight (volume)

| | |
|---|---|
| 212A / 951 | 100A : 12B (100A : 14B) |
| 212A / 9615 | 100A : 60B (100A : 73B) |
| 212A / 9816 | 100A : 15B (100A : 17B) |

**EPOPRO 212A** is a versatile, clear unfilled epoxy resin that can be cured with a number of different hardeners to form a solid transparent polymer with a variety of properties.

The cured polymer exhibits excellent thermal, mechanical, and electrical properties and superior adhesion to many materials

**Suggested Applications:**

- **212A** / **951** - This room temperature curing system exhibits ultra-low viscosity and excellent impregnation of wire wound devices including coils, small motors and transistors. When cured it produces a semi-rigid polymer with very low shrinkage, excellent moisture resistance and outstanding electrical properties

- **212A** / **9615** - This room temperature curing system provides a low-to-medium viscosity system with a long work life and a very low exotherm allowing for the casting or potting of devices with resin sections up to 2" thick. It is an excellent adhesive and encapsulant for applications such as motors, relays, switches and solenoids. When cured it produces a semi-rigid polymer with very low shrinkage, excellent moisture resistance and outstanding electrical properties. Hardener 9615 is relatively mix ratio insensitive and in some cases the mix ratio can be adjusted to modify the mechanical properties of the cured polymer.

- **212A** / **9816** - This room temperature curing system provides a low viscosity system that is excellent for many adhesive and impregnating applications. When cured it produces a semi-rigid polymer with very low shrinkage, excellent moisture resistance and outstanding electrical properties.

**Benefits:**

- 100% solids (no solvents)
- A range of processing parameters are available based on hardener selection
- Cured product is generally tough and exhibits resistant to both impact & thermal shock
- Excellent mechanical & dielectric properties

**Storage Guidelines:**

Store these materials in a clean, dry environment in their tightly closed original containers. These products are not considered temperature sensitive, but should ideally be stored at temperatures between 18-30°C (64-86°F). Under these conditions the products will have a minimum shelf-life of 12 months from the date of shipment. If upon opening, crystallization of the resin or hardeners is observed, heat the component to 40-60°C for several hours to melt the crystals. Allow the material to cool to room temperature before using.

**Processing Guidelines:**

This system can be mixed manually or using dynamic or static mixing systems. Whatever method is chosen, be sure to accurately weigh both the resin and the hardener prior to mixing them and ensure the correct mix ratio is used.

If mixing manually mix for at least 2 minutes and be sure to scrape the walls and bottom of the mixing vessel to be sure that all of the material is thoroughly mixed. To ensure a void free casting, vacuum de-air the mixture after thorough mixing.

A vacuum of 28 inches of mercury is generally sufficient to remove the vast majority of entrapped air within 5-10 minutes. Vacuum de-airing of the mixture will ensure optimal electrical insulation characteristics of the cured encapsulant.

If processing in a humid environment, it may be advisable to fully cure within an oven at 40-60°C in order to prevent vapor absorption that can lead to streaks on the surface of the casting

| **Mix Properties:** | | **212A / 951** | **212A / 9615** | **212A / 9816** |
|---|---|---|---|---|
| Initial mixed Viscosity @ 25°C (77°F) | ASTM D 2393 | 500 cP | 4,200 cP | 900 cP |
| Gel Time, 100 g. @ 25°C (77°F) | ASTM D 2393 | 30 minutes | 160 minutes | 30 minutes |
| Gel Time, 20 g. @ 65°C (150°F) | ASTM D 2393 | < 6 minutes | | |

**Recommended Cure Schedules**

24 hours @ 25°C **or** 2 hours @ 65°C

Please note: any cure schedule selected for use should be confirmed through testing as being appropriate for your particular processing methods and for your intended application

| **Cured Properties** (cured 7 days @25°C) | | | | |
|---|---|---|---|---|
| Appearance | Visual | Clear Amber | Clear Amber | Clear Amber |
| Specific Gravity | ASTM D 1475 | 1.20 g/cc | 1.11 g/cc | 1.19 g/cc |
| Shore Hardness @ 25°C | | 82 D | 78 D | 83 D |
| @ 95°C | ASTM D 2240 | 80 D | 67 D | 79 D |
| @ 150°C | | 40 D | 35 D | 35 D |
| Tensile Strength at break | ASTM D-638 | 8,300 | 7,500 | - |
| Tensile Elongation | ASTM D-638 | 1.4% | 1.0% | - |
| Flexural Strength @ 25°C | ASTM D-790 | 11,500 psi | 10,000 psi | 16,000 psi |
| Compressive strength | ASTM D-695 | 16,000 psi | 18,000 psi | 17,000 psi |
| Cure shrinkage | ASTM D-2566 | 0.19% | - | - |
| Glass Transition Temp. (Tg) | Perkin Elmer Appl. Cast #20 | 58°C | - | - |
| Coefficient of Thermal expansion (Alpha 1 / Alpha 2) | ASTM D-381 | 77 / 240 ppm/°C | - | - |
| Water absorption | | | | |
| 24 hrs @ 25°C | ASTM D 570 | 0.30% | - | - |
| 2 hrs @ 100°C | | 0.95% | 0.65% | 1.69% |
| Thermal Conductivity | ASTM D-2214 | 0.22 W/mK | 0.21 W/mK | 0.22 W/mK |
| Weight loss, 48 hrs @ 204°C | ASTM D-570 | 1.81% | 3.5% | 2.63% |
| IEEE Thermal Class Rating | | Class A (105°C) | Class A (105°C) | Class A (105°C) |
| Arc Resistance | ASTM D-495 | 84 seconds | - | - |
| Dielectric Strength, 1/8" | ASTM D- 149 | 390 volts/mil | - | - |
| Volume Resistivity | | | | |
| @25°C | | 2.15 x $10^{15}$ Ω-cm | 1 x $10^{15}$ Ω-cm | 1 x $10^{15}$ Ω-cm |
| @50°C | | 3.7 x $10^{10}$ Ω-cm | 1.4 x $10^{10}$ Ω-cm | 7.0 x $10^{9}$ Ω-cm |
| @150°C | | 2.5 x $10^{9}$ Ω-cm | 4.1 x $10^{8}$ Ω-cm | 2.1 x $10^{8}$ Ω-cm |
| Dielectric Constant/ Dissipitation factor | | | | |
| @60Hz | | 4.0 / 0.0055 | 3.4 / 0.0065 | 4.0 / 0.006 |
| @ 1KHz | | 3.9 / 0.018 | 3.1 / 0.013 | 3.9 / 0.011 |
| @ 1MHz | | 3.6 / 0.020 | 3.0 / 0.016 | 3.5 / 0.027 |

**Handling Precautions:**

Mandatory and recommended industrial hygiene procedures should be followed whenever these products are being handled and processed. For additional information please consult the corresponding material safety data sheets.

**Exotherm Warning:** Like most epoxy systems the EpoPro 212 systems produce heat during curing. When a large mass of these materials are mixed or placed together during curing, large amounts of heat can be produced. In some circumstances this heat can be enough to cause burns or to lead to a breakdown of the epoxy system. (With the potential, in extreme circumstance, for the production of black acrid smoke or even flames.) To prevent problems, we do not recommend mixing more than about 1 lbs. (~ 453 grams) of these systems at one time unless they will be quickly used in such a way as to break up the mass of the system (ex. by application to parts, by spreading it out to bond together components, etc.) or unless its temperature is controlled so as to eliminate hazards. (ex. by using a cooling system, by protecting users from the heat generated and/or by containing the material in an areas where any heat and any vapors given off can be safely contained.) Exotherm is less of a concern for the EpoPro 212A/ 9615 system than for the other two systems due to its slower reaction speed, but caution is recommended even with this system when mixing quantities greater 1 lbs. Please call us to discuss your application particulars if you have any concerns about working with these materials.

## Personal Hygiene:

**EpoPro 212A**

**WARNING! COMBUSTIBLE**. Causes severe eye irritation. Causes skin irritation and possible allergic reaction. Harmful if inhaled. Harmful if swallowed. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling

**Hardener 951**

**CORROSIVE!** Causes severe eye and skin burns and possible allergic skin reaction. Vapor irritating to eyes, skin and nasal mucous membranes. Harmful if swallowed. Do NOT get in eyes, on skin, or clothing. Wear chemical splash goggles and impervious gloves when handling. . Avoid prolonged or repeated contact with skin. Wash thoroughly after handling

**Hardener 9615**

**WARNING!** Causes severe eye irritation and possible eye damage. Causes severe skin irritation and possible allergic skin reaction. Do NOT get in eyes, on skin, or clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Keep containers closed when not in use. Do NOT take internally. Harmful if inhaled. Harmful if swallowed. Wash thoroughly after handling

**Hardener 9816 - Warning! !** Causes severe eye irritation and possible eye damage. Causes severe skin irritation and possible allergic skin reaction. Harmful if inhaled. Harmful if swallowed.

## First Aid

In case of contact:

**Skin** - Wash skin thoroughly with mild soap and water. Remove contaminated clothing and wash before reuse. Discard contaminated shoes and other articles made of leather

**Eyes** - Flush eyes with plenty of water for 15 minutes and get prompt medical attention.

**Inhalation** - Remove person to fresh air

**Ingestion** - Do not induce vomiting. Dilute with plenty of water and contact physician immediately. Never give anything by mouth to an unconscious person

## Disclaimer:

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